

velopment is seen in the network of railway lines which now traverse the country throughout its length and breadth. Canada has grown on her lines of communication. In 1905, there were 20,487 miles of steam railways; in 1871, only 2,695, a mileage increase in 34 years of 660 per cent. The mileage increase of the 1881 figures over the 1871, was 172 per cent.; of 1891 over 1881, 88 per cent.; of 1901 over 1891, 38 per cent.; and of 1905 over 1901, 14 per cent. It could hardly be expected that the large mileage percentage increases of the early years could be continuous, but there is more railroad building than ever. Fifteen years hence, a comparison of the total length of track with that of 1871, will produce an astonishing result.

A brief review of the histories of the chief Canadian railways will give a better idea of the vast amount of construction work which has been undertaken and which will increase for some years to come.

The Grand Trunk system now comprises 4,177 miles of railway, of which 921 miles on the main line are double-tracked. This does not include the Central Vermont and Canada Atlantic lines, which, with a joint mileage of nearly 1,000, are under Grand Trunk control. The system includes also three great viaducts and the St. Clair tunnel. The viaducts are the Victoria Bridge at Montreal, completed in 1860 and rebuilt in 1898; the Niagara Falls Bridge, completed in 1897, to replace the suspension bridge built 40 years before; and the International Bridge, near Buffalo, opened for traffic in 1873 and rebuilt in 1901. The Sarnia tunnel was finished in 1890. During 1905 the system carried over 11,000,000 passengers and nearly 15,000,000 tons of freight. The Grand Trunk was chartered in 1852, and is still adding yearly to its mileage.

The Grand Trunk Pacific Company was incorporated in 1903 to build a railway from Winnipeg to the Pacific Ocean, and to operate this along with a Dominion Government line from Winnipeg to Moncton as the "National Transcontinental Railway," with a total mileage on its main line of about 3,300.

The Canadian Pacific Railway charter dates from 1881, and during the quarter of a century that has since elapsed it has acquired the ownership or control of a grand total of 11,321 miles of completed road, exclusive of all the branch lines put under construction in 1906. The main line, taken up by the company in 1881, was completed in 1885, and since the latter date the mileage of its system has been constantly increasing.

Steam and Electric Traction.

The Canadian Northern system is made up of a number of widely separated short lines, mostly in Manitoba, Saskatchewan, and Alberta, though a new section has just been completed between Toronto and Parry Sound. Construction work was begun by the company in 1896, and in 1905 the completed mileage was 2,557. The main line extends from Port Arthur, on Lake Superior, to a point 50 miles beyond Edmonton. The Canadian Northern owns or controls several railways in the Eastern Provinces, which increase the total to 3,350 miles.

The Intercolonial Railway and the Prince Edward Island Railway are owned and operated by the Dominion Government. The former extends from Montreal to Halifax, with several branches, the most important being extensions to St. John, in New Brunswick, and Sydney, in Cape Breton. The total mileage of the Intercolonial and its branches is 1,446.

The number of operatives, exclusive of those engaged in construction, is about 75,000, and it is predicted that for the next seven years 20,000 men will be occupied in the building of new tracks alone. It can at once be realized that openings for construction supplies, are almost illimitable.

We are told that steam traction in Canada is in its infancy. Electric traction is scarcely out of its cradle.

Power from Niagara has been utilized and other waterfalls are to be made use of commercially. It is no wide stretch of imagination to say that electrical development has an immense future before it in this country. In four years, electric railway mileage has increased 18 per cent.

Buildings have sprung up rapidly throughout the country. It is only natural that they should, as the population is increasing by leaps and bounds.

Rapid Building Development.

Letters have been received by the "Canadian Engineer" from almost every big city, from the coast, from the West, the North-West, and the East, telling the story of the remarkable increase in new structures, during the past year. There were erected in Montreal during 1906 1,484 new buildings, valued at \$7,745,023, as compared with 1,145, valued at \$4,779,380 in the year preceding. The annual report of the Builders' Exchange shows that the building operations of 1906 in Montreal, included 1,240 houses, 2,242 dwellings, 70 stores, 28 warehouses, 41 factories, 4 churches, 6 schools, 1 hotel and 3 office-buildings. Individual structures to the number of ten each exceed in estimated cost \$100,000.

The value of the building permits in Toronto for the past year have increased over 1905 by \$2,812,488, and have now reached the total of over \$13,000,000. There is also marked development in the Northwest. The value of new buildings erected during 1906 in Regina was \$1,982,330; in Edmonton, \$1,863,894; and in Calgary, \$1,109,161.

The building industry has recognized the great possibilities of cement and concrete as construction materials. One might think this had no bearing on the iron and steel industry. But there is an enormous demand, one which is growing rapidly for metal skeletons. Then again steel plays a prominent part in reinforced concrete erections. A glance at an interesting trade journal—the Canadian Cement and Concrete Review,—(published in Toronto), and especially at its illustrations, clearly proves that steel and reinforced concrete construction will assume a very important role in the history of building in Canada. For example, Winnipeg has in view a handsome new grain exchange. It will be six stories high, and the entire construction, with the exception of the enclosing walls, is to be of concrete reinforced with metal rods.

The largest reinforced concrete bridge in Canada has recently been constructed across the Rideau River, a few miles above the city of Ottawa. The reinforcement consists of twenty-four round steel rods of one and a quarter inches diameter in the intrados, and the same in the extrados. One-half inch round shear bars are attached to these rods at right angles, so as to hold the two sets of bars in the required position. One inch round steel rods, two feet apart, are also placed transversely to take care of temperature stresses.

Steel and Concrete Era.

These are but two examples of hundreds. An interesting article, which recently appeared in the Canadian Cement and Concrete Review, on this subject, says:—"The fact that cement is playing a more and more important part in almost every kind of construction work causes frequent enquiry as to the reasons which have induced such a development in constructional practice. The latest and perhaps most rough-and-ready process of mixing concrete, which consists of mixing cement, sand and gravel with cinders or broken stone, and then flooding the mixture with water from a hose, may be seen in operation on all big works—house and hotel building, railroad, piers and bridges, sidewalk construction, and a hundred other enterprises."

"There are three strong reasons why cement is the material of the epoch in permanent buildings. Firstly, there is scarcely anything in which cement